

SOME RATS AND MICE OF THE MALAY ARCHIPELAGO

by

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I: **Bandicoot-rats.**

I have been entrusted by Dr. K. W. DAMMERMAN, Director of the Zoological Museum at Buitenzorg, with a collection of Bandicoot-rats (Dutch: borstelrat, Malay: wirok) from Netherlands India for determination. Two species are represented: a large one — the wellknown *Bandicota setifera*, and a smaller which is new and has not hitherto been recorded from the Malaysian Islands. Unfortunately the specimens are unaccompanied by measurements and have been either mounted or skinned from alcohol so that the colours must be accepted with a little reserve.

Bandicota setifera (Plate II).

Mus setifer HORSFIELD, Zoological Researches in Java 1824, coloured plate and description. (Java); JENTINK, Cat. Mus. d'Hist. Nat. Pays-Bas, IX, 1887, pp. 211, 328 (Java, Sumatra), id. op. cit. XII, 1888, p. 64 (Java).

Nesocia setifer TJEENK WILLINCK, Nat. Tijdschr. Ned. Ind. LXV, 1905, p. 262 (Java, Sumatra).

Nesokia setifer SCHNEIDER, Zool. Jahrb. Jena, XXIII, 1905, p. 146, (Sumatra).

Bandicota setifera WROUGHTON, Journ. Bombay Nat. Hist. Soc. XVIII, 1908, p. 750 (Java).

Nesocia (Bandicota) setifera KONINGSBERGER, Java, Zoöl. en Biol. Buitenzorg 1915, p. 416 (Java).

There are many examples of this species from various parts of Java and it is evidently common in suitable localities.

According to HORSFIELD it is found at the confines of forests and woods and rarely approaches villages and dwellings; KONINGSBERGER writes of it as a member of the fauna of grass-lands, but says it seems to be in transition from a jungle-rat to a country-rat, as among the numerous rats collected in connection with plague in East-Java there were some of this species caught in the neighbourhood of native villages and even in houses.

The general upper colour of adults, due to the presence of numerous long shining bristles, is dark brown (perhaps nearest to Ridgway's „light seal brown” but darker). On the sides, where the long hairs are few, the

mouse-grey underfur becomes visible and there is some buff grizzling. The undersurface is a dull brownish grey grizzled with buff or dirty white. The fore and hind feet are clad with dark brown hair.

The fur of young animals is much less coarse and shining and rather paler above. Below they are hair brown, markedly grizzled with whitish.

The mammae are apparently 3-3=12.

Dr. DAMMERMAN has furnished me with a list of measurements of ten alcoholic specimens amongst which the following have a total length of over 500 mm.

	Head and body	Tail
	Cheribon 305 mm.	249 mm.
	Plered 306	246
	Indramajoe 283	239
	Cheribon 267	240

The skulls are interesting: even the smallest of those figured (Plate II) has the teeth worn and the basioccipital suture fairly closed: it is, however, very immature; but anyone unaccustomed to deal with these animals in sufficient numbers might quite possibly regard it as adult, even the medium-sized skulls illustrated, though perhaps adult, are by no means full grown as comparison with the largest skull show. All belong to the same form which is probably the Malaysian representative of, and subspecies of, *Bandicota indica*, (BECHSTEIN: syn. *bandicota* BECHSTEIN).

For skull measurements see table p. 117.

[The Buitenzorg Museum possesses a specimen of *Rattus norvegicus* from Palembang, Sumatra. It is a very abnormal individual and in colour bears an extraordinary resemblance to *B. setifera*: but the fur of the upper parts, though very worn, is obviously shorter and less profuse. The under parts are almost as dark a brown as the back and are scarcely grizzled.

The skull is that of a typical *Rattus norvegicus* as are the ears, feet and claws. The animal is adult with worn teeth and I have given its skull dimensions, for purpose of comparison, with the measurements of the skulls of *Bandicota setifera*.]

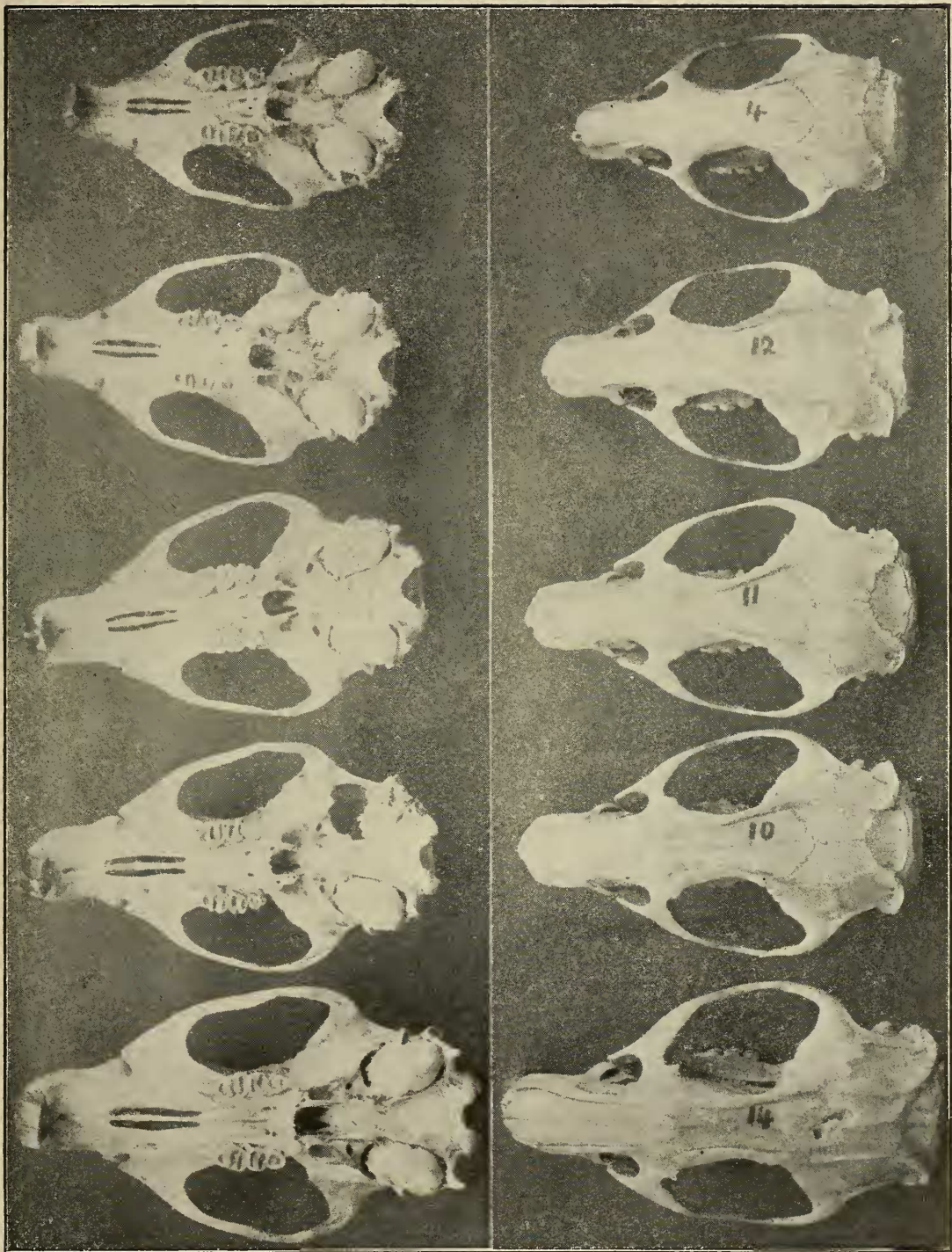
***Gunomys bengalensis sundavensis* subsp. nov. (Plate III).**

Colour the same as in examples of *G. b. bengalensis* of similar size and age; and also apparently the same as in *G. varillus* Thos. of Pemang ¹). Skull with rostrum lighter (less broad and deep). Incisors more projecting, not curved backwards as in *b. bengalensis*; molars larger, markedly broader, the first lamina of *m*¹ especially so. Mammae recorded as twelve in number; in *b. bengalensis* there are sixteen.

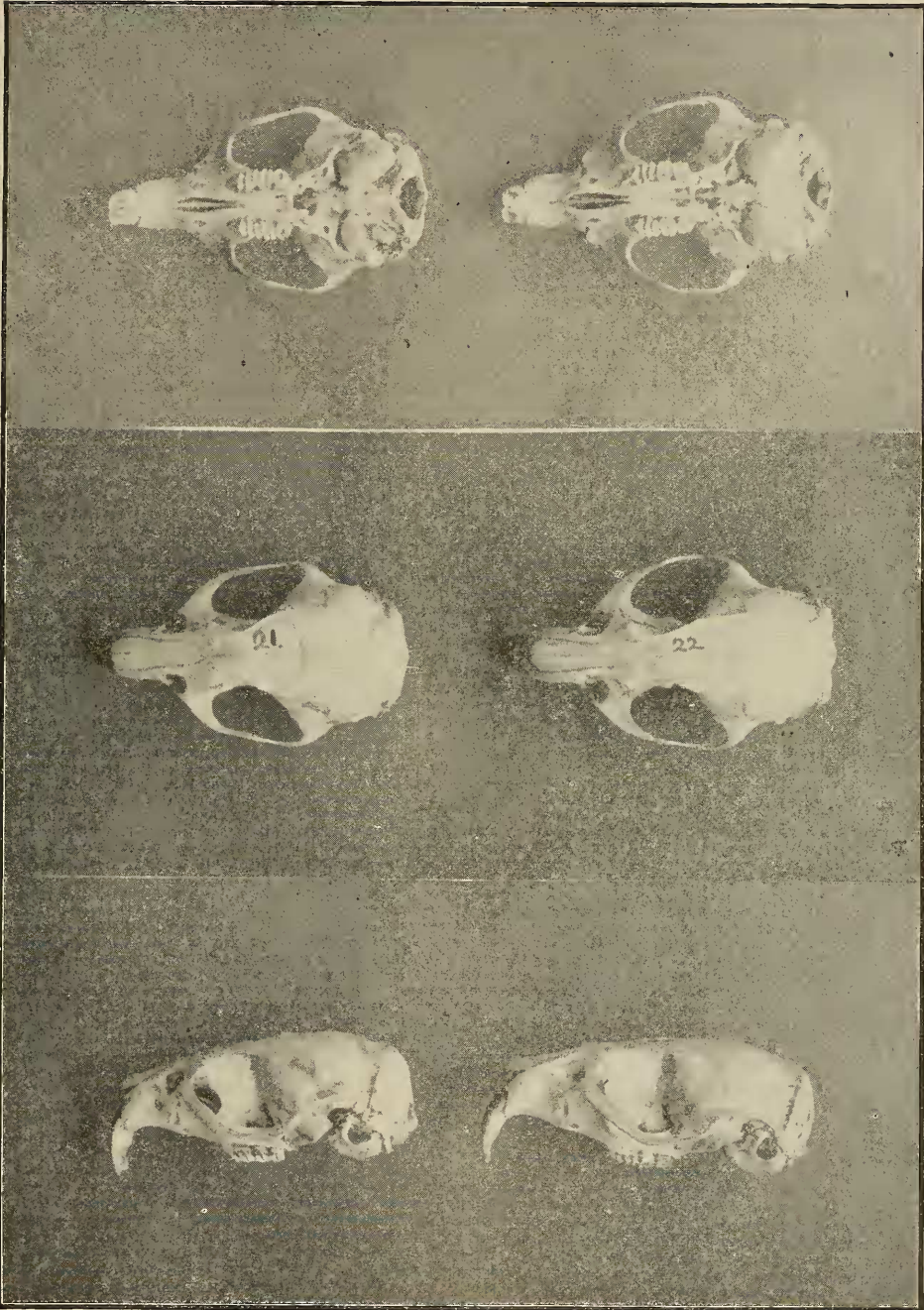
Long bristles few and confined to the posterior back.

General colour above a grizzle of dar brown and buff or ochraceous (the brown in excess) becoming on sides and lower parts mouse-grey grizzled with pale buff, the latter clearest and most marked on the throat and ventral area, the general effect otherwise being smoke-grey. Base of fur neutral grey. Feet dark, sides of hindfeet and the ankles paler. Tail finely scaled and indistinctly clad with very short hairs.

¹) Ann. and Mag. Nat. Hist. (7) XX, 1907, p. 203.



Skulls of *Bandicota setifera*.



Skulls of *Gunomys bengalensis sundavensis*.

Specimens examined: A male and female from Olee Lheue (Oleleh) Atjeh, collected on 22nd September 1916 (Co-types: Nos. 22 & 21); two males and two females from Meureudoe (Marudu) Atjeh, North Coast of Sumatra; and a female from Wlingi near Blitar, East Java.

As these specimens were obtained for a plague Commission it is probable that they were all caught in houses.

For skull measurements see table p. 118.

Hind-feet of co-types; ♂ 33, ♀ 32 mm.

Remarks: Though in some individuals the basi-occipital suture is practically obliterated and the teeth are well worn I do not think that any of them are fully adult: but I have no doubt of their distinctness since they have been compared with examples of *G. b. bengalensis* of similar size and age.

The principal differences between *Bandicota* GRAY, and *Gunomys* THOS., shown by this material seem to be:

<i>Bandicota</i>	<i>Gunomys.</i>
Skull a trifle narrower; breadth to length index 53—56.	Skull a trifle broader; breadth to length index 55—60.
Mammæ 12.	Mammæ 12 (?) to 18.
Tail averaging proportionately a little longer; more than .8 of head and body.	Tail averaging proportionately a little shorter; less than .8 of head and body.
Palatal foramina less contracted posteriorly so that their outer borders are only slightly convex.	Palatal foramina more contracted posteriorly so that their outer borders form sigmoid curves.

The differences seem hardly of generic importance.

Skull Measurements.

	<i>Bandicota setifera</i>					<i>Rattus decumanus</i>
	No. 14. ♂	No. 10. ♀	No. 11. ♂	No. 12. ♂	No. 4. ♀	No. 23 ♀
Greatest length	66	59	56	54	49	53
Condylo-basilar length	60	54	53	50	45.2	47.5
Basilar length	58	51	49	47	42	45
Palatilar length	34	30.5	30	29	26	25
Length of palatal foramina	12.3	11.4	10	9.2	9	8.1
Diastema	20.2	18.2	18	15.2	14	15.6
Nasals	24.6×8.0	21.0×6.9	20.0×6.2	18.3×6.0	17.0×5.3	20.2×6.1
Interorbital breadth	9	8.8	8.4	8.4	8	7.4
Breadth between ridges } on parietals }	8.8	10.2	11	12.1	10.9	12
Zygomatic breadth	35.5	32.4	31.5	30	27	27.5
Upper tooth row (alveolus)	11.9	11	11.2	11	10.9	7.2
Breadth of <i>m</i> ¹	3.5	3.5	3.4	3.4	3.5	2.3

	Gunomys bengalensis sundavensis			
	No. 22 Type ♂*	No. 17 ¹⁾ ♂*	No. 21 Type ♀	No. 16 ²⁾ ♀
Greatest length.	39.6	40	38	37
Condyllo-basilar length. . .	36.8	37	34.7	34.1
Basilar length	34.2	34.6	32	31.7
Palatilar length.	21	21	19.7	19
Length of palatal foramina	8	9	8.3	7.4
Diastema	12.1	11.7	11.2	11
Nasals	11.8×4.3	12.2×4.0	11.5×4.1	11.1×4.0
Interorbital breadth . . .	6.2	6.2	6.2	6
Breadth between ridges on / parietals \	10.1	10.6	11	10.6
Zygomatic breadth	24	24 (c.)	23	22 (c.)
Upper tooth row (alveolus).	8.3	8.2	8.1	8
Breadth of <i>m</i> ¹	2.9	2.9	2.7	2.7

The teeth of two females of *G. b. bengalensis* from Calcutta, with skulls of the same size as the female skulls above, measure: lengths 7.1, 7.3; breadths 2.2, 2.3 mm.

Explanation of plates.

Plate II (natural size).

Skulls of *Bandicota setifera* from Java.

No. 4. Female from Galoer Tjiamis.

No. 12. Male from Batang.

No. 11. Male from Indramajoe.

No. 10. Female from Indramajoe.

No. 14. Male from Tjiandjoer.

Plate III (natural size).

Skulls of *Gunomys bengalensis sundavensis* from Sumatra.

No. 22. Co-type (female) from Olee Lheuë, Atjeh.

No. 21. Co-type (male) " " " "

¹⁾ A second male from Meureudoe, N. Sumatra.

²⁾ A female from Wlingi, E. Java.

II. Mice.

Dr. K. W. DAMMERMAN, Director of the Zoological Museum at Buitenzorg, has submitted to me for determination a small collection of mice. I find amongst them two forms or species.

1. *Mus musculus homourus.*

Mus homourus Hodgson, Ann. & Mag. Nat. Hist., XV, 1845, p. 268 (Nepal).

Specimens examined:

2 ♀.	Sabang, Poeloe Weh, N. Sumatra.	Mammae	10
1 ♂ 3 ♀.	Koetaradja, Atjeh, " "	"	8
2 ♀.	Fort de Kock, W. Sumatra.	"	10
2 ♂ 1 ♀.	Blinjoe, Bangka.	"	10
1 ♀.	Serasan, S. Natoena Ids.	"	8
2 ♂ 2 ♀.	Buitenzorg, Pekalongan & Probolinggo, Java.	"	10
2 ♂	Pamekasan, Madoera.	"	—
1 ♂ 3 ♀.	Lombok.	"	8
1 ♂	Bima, Soembawa.	"	—
1 ♂ 1 ♀.	Moena Id, S. E. Celebes.	"	8
1 ♂ 2 ♀.	Taroena, Sangir Ids, N. Celebes.	"	10

All these appear to be the common Asiatic house-mouse of which Mr. R. C. WROUGHTON (who has a better acquaintance with the European form than I have) says that it differs from the typical animal in having the lower parts strongly washed with ochraceous instead of being bluish grey there. ¹⁾

The Asiatic animal, WROUGHTON states ²⁾ should bear the name *Mus urbanus* HODGSON. But since WROUGHTON considers *homourus* to be synonymous with the latter ³⁾ it cannot be called *urbanus* as *homourus* has page priority. I therefore use the name *homourus* here for I have no material to show whether the Malaysian mouse is different from the Indian one: but if it is it will probably have to be called *Mus musculus rama* CANTOR ⁴⁾.

The specimens listed cannot be distinguished from each other: the mammae are probably always $3 - 2 = 10$; for in cases where only eight are recorded I expect the taxidermist has omitted to count the anterior pectoral pair.

The feet vary considerably in colour: they are either dark or white throughout, dark with white digits, or pale brownish white.

One finds in passing eastwards from the Malaysian sub-region a marked loss of teeth. In the 18 Malaysian specimens examined the posterior upper molar is missing on one side in one example only and both posterior lower molars in five examples. In the Lombok series both posterior upper molars have disappeared in three out of the four skulls and all the posterior lower molars are missing. In two of the Sangir specimens all the posterior molars are absent: in the Moena skulls only a single lower molar has been lost. The sockets for these teeth cannot be perceived.

¹⁾ Journ. Bombay Nat. Hist. Soc., XXVI, 1920, p. 958.

²⁾ tom. cit., p. 1028.

³⁾ tom. cit., p. 959.

⁴⁾ CANTOR in Blyth, Journ. Asiat. Soc. Bengal, XXXIV, part 2, 1865, p. 194. Malacca.

2. *Mus (musculus?) ouwensi*, nov.

Above dark brown very finely grizzled with ochraceous; bases of hairs dark grey: face and top of muzzle slightly tinged with ferruginous.

Underparts not sharply margined, white throughout or very pale silvery white: bases of hairs grey. Feet white. Tail dark above and pale below. Mammæ 3—2=10.

Type. Adult male (skin and skull) collected at Probolinggo, East Java by Lim King Siang on 15th February, 1915. No. 173.

Specimens examined. Seven skins and skulls and eight individuals in alcohol from Rembang, Probolinggo and Temangoengan, E. Java, and two skins and skulls from Pamekasan, Madoera Island.

The two examples from Madoera have a small white spot on the forehead; but otherwise do not differ from the others.

External measurements taken in the flesh. An average alcoholic specimen: head and body, 55; tail 62; hindfoot, s.u., 15; ear from meatus 11 mm. The largest specimen: head and body, 60; tail, 68; hindfoot, 16; ear 13 mm.

Skull of the type. Greatest length, 21.0; Condylbasilar length, 19.0; basilar length, 17.3; palatilar length, 9.6; diastema, 5.5; upper molar row (alveoli), 3.3; length of palatal foramina, 4.4; length of nasals, 7.0; interorbital breadth, 3.6; cranial breadth, 9.6; Zygomatic breadth 11.0 mm.

Remarks. In spite of the fact that this animal is found in Java and Madoera with *M. m. homourus* I hardly care to regard it as a distinct species for the skulls and teeth of both are exactly alike: the difference lies only in the colour. Therefore I leave its rank undecided for the present. Major P. A. OUWENS, Curator of the Zoological Museum, Buitenzorg, who was the first to collect it and after whom it is named, knows it well in life and states that instead of running like the common house-mouse it progresses by a series of leaps. *Mus ouwensi* is a field mouse.

III. House-rats.

1. *Rattus rattus diardi*.

Mus diardi JENTINK, Notes Leyden Museum, II, 1880, p. 13 (West Java).

Mus griseiventer BONHOTE, Fasciculi Malayenses, Zool. 1, 1903, p. 30, pl. II fig. 3, pl. IV fig. 5 (Perak, Malay Peninsula); DAMMERMAN, Mededeel. Lab. v. Plantenziekten, No. 24, 1916, pp. 1, 7—9 (Java).

Rattus griseiventer? ROBINSON & KLOSS, Journ. Fed. Malay States Mus. VII, 1919 p. 280 (Sumatra).

1 ♂	3 ♀	Onrust Id. near Batavia, Java	
	3 ♀	Pandeglang	"
	1 ♀	Cheribon	"
2 ♂	4 ♀	Soerabaya	"
1 ♂		Kaligoea	"
	1 ♀	Pamekasan	Madoera
	4 ♀	Boeleling	Bali
	1 ♀	Kloengkoeng	"
	1 ♀	Laboean Amok	"

1 ♀	Bima	Soembawa
2 ♂ 1 ♀	Telok Betong	S. Sumatra
1 ♂ 7 ♀	Palembang	"
1 ♂ 1 ♀	"	(Talangbetoetoe) S. Sumatra
2 ♀	Benkoelen	W. Sumatra
1 ♂ 1 ♀	Tapanoeli	"
4 ♀	Djambi	E. Sumatra
1 ♂ 1 ♀	Rengat	"
1 ♂ 1 ♀	Kotaradja	N. Sumatra
1 ♀	Blinjoe	Bangka
1 ♂ 1 ♀	Poeloe Toedjoeh,	between Bangka and Singkep Ids.
3 ♂ 3 ♀	Serasan,	South Natoena Ids
2 ♂	Singkawang	W. Borneo
1 ♂ 1 ♀	Mempawa	"

This is the house-rat of Malaysia.

The individual variation is very great and in the series listed above together with an equally large series from the Malay Peninsula there seem to be no characters which belong solely to any one particular locality: thus I find it impossible to recognise any local races in the material examined. Not only are there great differences of colour but the cranial characters are also unstable: for instance, in a series from one place there is a marked difference in the size and shape of the bullae. The upper pelage is brown streaked with brownish black but the ground-colour varies from bright ochraceous to isabelline or dull brown. The variation of colour below is greater still and the ventral surface may be buffy-white, buffy, fawn, pale grey, dark smoky grey, isabelline, rusty, drab, hair-brown, or combinations of these; frequently one colour is washed with another; sometimes there is a dark gorget and a dark median line down the abdomen. The ventral fur is often rather harsh and adpressed, more so than in the field rat.

The feet are either pure white, white washed with ochraceous, dark mesially with the sides and digits pale, or entirely dark. The tail is always dark throughout and fairly well clad with short hairs, generally more so than in the field-rat. There are always ten mammae in the females — 2 pairs pectoral and 3 pairs inguinal.

On the whole the Sumatran series is more rusty beneath than the others, but with one exception it is exceeded in this respect of the two specimens from Onrust Id.

The Buitenzorg Museum material is unfortunately without measurements but it does not appear from the dimensions given by DAMMERMAN (l.c.) that there is any difference in the proportions of tail to head and body length between Javan and Malayan individuals.

Though a house or town rat this form is occasionally found in cultivated land near buildings and villages where it probably breeds with the true field or country rat — this cross-breeding producing individuals which it is difficult to allocate.

2. *Rattus concolor ephippium*.

Mus ephippium JENTINK, Notes Leyden Museum, II, 1880 p. 15 (Sumatra).

Rattus concolor ephippium ROBINSON & KLOSS, Journ. Fed. Malay States Mus. VII, part 2, 1918, p. 56.

Mus concolor DAMMERMAN, Mededeel. Lab. v. Plantenziekten, No. 24, 1916, pp. 3, 7—9.

1 ♂	5 ♀	Olee Lheuë, Atjeh, N. Sumatra	Mammae	8
1 ♂	5 ♀	Koetaradja	"	8
	2 ♀	Tandjong Pinang, Riouw Id, S. E. of Singapore	"	8 and 6
2 ♂	2 ♀	Poeloe Toedjoeh between Singkep and Bangka Islands, South China Sea	"	8
	1 ♀	Serasan Id., South Natoena Islands	"	8
	1 ♀	Soekaboemi, West Java	"	8
2 ♂	2 ♀	Semarang, Mid Java	"	8 and 6
	1 ♀	Tabanan, Bali	"	8
1 ♂	juv.	Laboean Hadji, Lombok		

This is a small rat with the pelage of the upper parts composed partly of hair, partly of flattened spines. The tail, though generally a little darker above than below, is dark throughout and the feet are nearly always white. In colour the subspecies is very variable ranging from dark brown to tawny brown above; and below from smoky grey to silvery white: frequently animals with paler underparts have them strongly washed with buff; sometimes there is a brownish stripe down the centre of chest and abdomen and occasionally the underparts are brownish. The audital bullae are large.

All insular Malaysian specimens that I have seen appear to belong to the present race.

R. ephippium like *R. r. diardi*, appears to be undoubtedly a house-rat; for though sometimes taken in open country it seems to be so met with only in the neighbourhood of buildings.

IV. Two New Rats.

I have found the following new subspecies in the collection of rats belonging to the Zoological Museum at Buitenzorg.

1. *Rattus rajah hidongis* subsp. nov.

? *Mus rajah* MILLER, Proc. Washington Acad. Sci. III, 1901, p. 121.

Colour as in *R. rajah* (THOS.) and *R. pellax* (MILLER): differs from *R. similis* (ROB. & KLOSS) in having the inner sides of the limbs white continued to the feet. Skull with rostrum broader and less tapering than in both the former, much more so than in *R. similis*.

Above clay coloured, slightly ochraceous on the nape and sides and darkened dorsally by the tips of the numerous flat spines. Underparts, inner sides of the limbs and the hindfeet white, sharply margined. Muzzle brownish and the eyes surrounded by dark rings. Tail bicolored with a pale tip. Mammae 2 — 2 = 8. Dorsal pelage very spiny.

Type. Adult female (skin and skull) with slightly worn teeth. Collected on Serasan Id, South Natoena Islands, off Western Borneo on 12th August 1916. No. 185.

Skull measurements of the type: greatest length, 47; condylo-basilar length, 40; palatilar length, 20; combined palatal foramina, 6.9×4.0 ; diastema, 13.8; upper molar row (alveoli), 6.9; greatest breadth of nasals, 5.7; interorbital breadth, 7.4 zygomatic breadth, 21.3 mm.

Remarks. I have hitherto considered *Rattus surifer* (MILLER) to be the Malayan representative of *R. rajah* (THOS.) of Borneo. Mr. H. C. ROBINSON has recently, however, examined the type series of the latter and finds it to be of the same species as *R. pellax* (MILLER) of the Malay Peninsula.¹⁾

The two super-forms in Malaysia are, therefore, *Rattus surifer* and *R. rajah*.

The races of these in Borneo, the Malay Peninsula and Sumatra are respectively:— 1. *Rattus rajah rajah*, *R. r. pellax* and *R. r. similis*. 2. *Rattus surifer surifer*, *R. s. bandahara*²⁾ and *R. s. ravus*. *Rattus rajah* has not yet been taken in Java and I cannot separate Javanese examples of *R. surifer*³⁾ from the Sumatran form.

This nomenclature (without considering Indo-Chinese forms) shows the relationship of the various races inhabiting the large land masses of Malaysia, i. e. the southern half of the Malay Peninsula, Sumatra, Borneo and Java. The two species are much alike in Malaysia; but generally speaking *R. rajah* is a brighter animal, more tinged with orange, with the bases of the dorsal fur and spines grey; while *R. rajah* is duller with the base of upper pelage brownish: its nasals also extend posteriorly beyond the frontopremaxillary sutures.

2. *Rattus rattus bali* subsp. nov.

A field rat: the upper pelage composed of hair with grey bases and slender spines with pale bases: long piles or bristles on the rump. Above grizzle of ochraceous tawny and brownish black, below creamy white often with traces of a median grey stripe. Forefeet brown, hind feet white, broadly brown mesially.

Mammae 3 — 3 = 12.

Co-types. Adult male and female (skins and skulls) from Laboean Amok and Kloengkoeng, Bali, collected 5 July and 1 May 1915. Nos. 99 and 100.

Specimens examined. The co-types, three more from Kloengkoeng and two from Boeeling, Bali Island.

Skull measurements of co-types: greatest length 44.2, 44; condylobasilar length, 39, 39; diastema, 12.1, 12.0; upper molar row (alveoli), 8.1, 8.0; combined palatal foramina, 7.8×3.5 , 8.2×3.6 ; median nasal length, 16.0, 15.8; breadth of combined nasals 5.0, 5.4; zygomatic breadth, 21, 21 mm.

The skulls are robust with rather short broad rostrums, broad palatal foramina and large bullae.

¹⁾ vide Ann. & Mag. Nat. Hist. (9) VII, 1921, p.p. 234—6.

²⁾ Robinson, op. cit., p. 235.

³⁾ Not hitherto recorded from the island unless perhaps as *Mus jerdoni*.

V. *Rattus rattus rhionis*.

Mus rattus rhionis THOMAS & WROUGHTON, Ann. & Mag. Nat. Hist (8) III, 1909, p. 441, Bintang Id, Riouw Archipelago; Id., Journ. Fed. Malay States Mus. IV, 1909, p. 123.

Mus sp. near *rattus* (partim) LYON, Proc. U. S. Nat. Mus. XXXI, 1907, p. 655 (Batam Id); KLOSS, Journ. Straits Branch Royal Asiat. Soc. No. 50, 1908, p. 69.

The following specimens are in the Zoological Museum at Buitenzorg:

- 1 ♂ Tandjong Pinang, Riouw Id, S. E. of Singapore
- 2 ♀ Residentie Riouw Onderhoorigheden, Mammae 10
- 1 ♂ Palembang, S. E. Sumatra

This form is very dark above, sometimes almost black, and rather dark grey below (neutral grey). I cannot separate the Palembang example from the others: the type series came from Bintang and from its neighbour, Batam Id. The two females from the „Dependencies” probably came from Bintang. The record for Sumatra is the first.